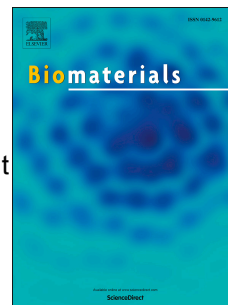


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One-pot synthesis of albumin-gadolinium stabilized polypyrrole nanotheranostic agent for magnetic resonance imaging guided photothermal therapy

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Abstract

Theranostic agents with perfect properties are needed urgently for the development of imaging guided photothermal therapy (PTT). In this work, Gd-integrated polypyrrole nanotheranostic agent (PPy@BSA-Gd) was successfully built through selecting bovine serum albumin (BSA) as both stabilizers for polymerization and biomimetic mineralization in "one pot". The obtained PPy@BSA-Gd possessed high stability and excellent photothermal property. Besides, relevant cellular assays indicated that PPy@BSA-Gd had fantastic cytocompatibility which could be further internalized by cancer cells. Due to their high longitudinal relaxivity value ($r_1 = 10.203 \text{ mM}^{-1} \text{ s}^{-1}$), PPy@BSA-Gd could serve as considerable probe for T_1 -weighted magnetic resonance imaging (MRI). After tail vein injection of PPy@BSA-Gd, the MR signal of tumor section exhibited a time-dependent increase, indicating effective tumor accumulation of PPy@BSA-Gd. Notably, when exposed to 808 nm laser, the tumor growth of PPy@BSA-Gd treated mice could be inhibited by photothermal ablation successfully. All the results demonstrated the well-designed PPy@BSA-Gd have the potential for tumor diagnose and photothermal therapy.

Key words: polypyrrole; photothermal therapy; biomimetic mineralization; MRI

1. Introduction

Photothermal therapy (PTT) as an light-induced hyperthermia strategy for cancer treatment has attracted increasing attention in recent years[1, 2]. Compared with traditional treatments for cancer, PTT possess the advantages of minimal invasiveness and high specificity, which has been considered to be a alternative approach for clinical application. To achieve effective PTT, PTT agents which can convert NIR

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